Methyl Parathion Technical Briefing

August 2, 1999

Introduction and Background Information

Overview

- Introduction
- Use Profile
- Human Health Risk Assessment
- Worker Risk Assessment
- Ecological Risk Assessment
- Questions

Introduction

Methyl Parathion Risk Assessments Consider:

- **Dietary Risk**: food, drinking water, and aggregate
- **Worker Risk**: handlers and postapplication workers
- **Ecological Risks**: birds, mammals, bees, and fish and other aquatic species

Methyl Parathion Risk Assessments *DO NOT* Consider:

- **Residential Risk**
  - methyl parathion has no residential or active public health uses
  - spray drift was not considered

Introduction

TRAC Pilot Public Participation Process for Methyl Parathion

Phase	Health Effects Assessment	Ecological Assessment
❶ "Error Only" Review	10/98	10/98
❷ Error Correction	11/98	11/98
❸ Public Comment Period	12/98	12/98
❹ Revised Assessment to USDA	6/99	6/99
❺ Develop Risk Mgt. Options	8/99	8/99
❻ Develop Transition Strategy	8-10/99	8-10/99

Introduction

Phase 1: "Error Only" Review by Registrant

- October 1998
- EPA had 30 days to respond to registrants' error comments

Phase 2: Error Correction

- November 1998
- No substantive corrections to Health Effects Assessment
- No substantive corrections to the Ecological Effects Assessment

Introduction

Phase 3: Public Participation

- 60-day public comment period (12/98 - 2/99)
- Significant comments received from registrants, public interest groups, environmental groups, beekeepers, and growers. Among these were:
  - Issues regarding the FQPA Safety Factor
  - Selection of endpoint for acute dietary and worker risk assessment
  - Clarification of use rates/supported uses
  - Additional information on endocrine disruption

Introduction

Phase 3: Public Participation (con't)

- Growers' comments noted:
  - Importance for codling moth
  - Lack of good alternatives on apples
  - Used in IPM programs
  - Few alternatives for some crop/pest combinations
- Beekeepers expressed concern over continued losses

Introduction

Data Received During the Public Participation Period

- Developmental toxicity study
- Multi-generation study
- Acute dermal study
- Acute oral study
- Residue chemistry studies

Data Received after the Public Participation Period

- Acute neurotoxicity feeding study in rats
- 5-day dermal neurotoxicity study

Regulatory History

- First Registered for Food Use in 1954
- Registration Standard Published in 1986
- Methyl Parathion Misuse in Home Settlement Agreement (1996)

Use Profile

- Sources of Use Data
  - USDA/NASS
  - California Department of Pesticide Regulation
  - Other sources (e.g., growers and registrant)

www.epa.gov/pesticides/trac/science

Use Profile

Usage

- 4.0 million pounds used per year (on average)
  - 3.5 million pounds used on cotton, corn, wheat, soybeans, and rice

High-Use Food Crops

- Crops for cancellation
  - ~25% crop treated for peaches and plums
  - ~18% crop treated for apples
- Remaining Crops
  - Each crop <15% crop treated

Use Profile

Major Use Regions

- California and Southeast on nut crops
- Delta states, California and Midwest on field crops

Use Profile

Recent Use Changes

- Children's foods for cancellation
  - All fruit uses (apples, peaches, pears, grapes, nectarines, cherries, plums)
  - Carrots, succulent peas, succulent beans, tomatoes
- Other uses for cancellation
  - Brussels sprouts, collards, kale, broccoli, cauliflower, artichokes, celery, spinach, turnips, lettuce, mustard greens
  - All non-food/feed uses (including mosquito larvacide use)

Use Profile

- Uses remaining
  - **Vegetables**
    (cabbage, dried beans, dried peas, onions, sweet potatoes, white potatoes)
  - **Nuts and field crops**
    (alfalfa, almonds, barley, corn, cotton, grass, hops, oats, pecans, rape, rice, rye, soybeans, sugar beets, sunflowers, walnuts, wheat)

Use Profile

Use Practices

- Application Methods
  - Ground boom, airblast, aerial, chemigation
- Product formulations
  - MC & EC
- Use Rates
  - Number of applications
  - Pounds per acre
- Reentry Intervals

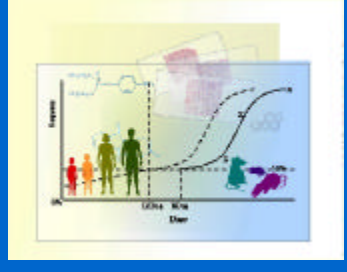
Use Profile

Examples of Use Information Incorporated into Risk Assessments

Crop	% Crop Treated		Application Rate (lb. ai/A)		Number of Applications		REI (days)
	Max.	Wt. Avg.	Max.	Average	Max.	Average	
Cotton	17	12	3.0	0.5	NS	3.0	2
Onions	9	5	0.5	0.5	NS	1.5	2
Pecans	3	1	2.0	1.3	NS	1.0	2
Rice	12	8	0.75	0.6	NS	1.0	2

NS = Not Specified

Human Health Risk Assessment



www.epa.gov/pesticides/op/methylparathion.htm

Risk Assessment Components

- Dietary
  - Food
  - Drinking Water
- Occupational
  - Handlers
  - Post-application workers
- Residential
  - There are no residential uses of methyl parathion
  - Aggregate (food, drinking water)

Dietary Risk Equation

Dietary Exposure = Consumption x Residue

Risk = Hazard x Exposure

Effect Levels

- Lowest Observed Adverse Effect Level = LOAEL
  - Is the lowest dose at which an “adverse” health effect is seen. Has units of mg per kg body weight per day.
- No Observed Adverse Effect Level = NOAEL
  - Is the dose at which no “adverse” health effect is seen. This dose is less than the LOAEL. Has units of mg per kg body weight per day.

Acute Hazard (toxicity)

- **Study**: 1-year Dietary Neurotoxicity Study in Rats
- **Endpoint:**
  Plasma, RBC and brain cholinesterase inhibition, and neuropathology
  - NOAEL: 0.11 mg/kgBW/day
  - LOAEL: 0.53 mg/kgBW/day

Chronic Hazard (toxicity)

- **Study**: 2-year Chronic Feeding Study in Rats
- **Endpoint (toxic effect)**:

  Systemic toxicity (hematological effects), neuropathology, and cholinesterase inhibition

  - NOAEL: 0.02 mg/kgBW/day
  - LOAEL: 0.21 mg/kgBW/day

Uncertainty and Safety Factors

10X	Interspecies Variability
10X	Intraspecies Sensitivity
10X	FQPA Safety Factor
1000X	Total Uncertainty and Safety Factors for all Dietary Risk Assessments

Special Sensitivity of Infants and Children

FQPA 10X Safety Factor Retained:

- Neuropathology in 3 studies:
  - Acute neurotoxicity study
  - Chronic/carcinogenicity study
  - One year neurotoxicity study
- Indications of increased severity of fetal/offspring effects in 2 out of 6 submitted reproductive and developmental studies in rats

Special Sensitivity of Infants and Children

- Fetal/neonate susceptibility reported in open literature citations:
  - Gupta *et al.,* 1985
  - Benke and Murphy, 1975
  - Pope *et al.,* 1991
  - Pope and Chakraborti, 1992
- Evidence of possible endocrine disruption

Expression of Risk for Methyl Parathion

- Dietary Exposure

$$RfD = \frac{NOAEL}{UF}$$

- PAD = Population Adjusted Dose
- Less than 100% PAD is not of concern
- The smaller, the better

$$PAD = \frac{RfD}{FQPA\ Safety\ Factor}$$

$$\%PAD = \frac{Exposure}{PAD} \times 100$$

Acute Population Adjusted Dose (aPAD)

aPAD = 0.00011 mg/kg/day, based on:

- NOAEL of 0.11 mg/kg/day
- Uncertainty Factors:
  - 10X interspecies extrapolation
  - 10X intraspecies variability
  - 10X FQPA Safety Factor

Chronic Population Adjusted Dose (cPAD)

cPAD = 0.00002 mg/kg/day, based on:

- NOAEL of 0.02 mg/kg/day
- Uncertainty Factors:
  - 10X interspecies extrapolation
  - 10X intraspecies variability
  - 10X FQPA Safety Factor

Acute and Chronic Dietary Risk Assessment

Risk = Hazard x Exposure

Exposure = Consumption x Residue

Exposure - Consumption

- USDA's Continuing Survey of Food Intake by Individuals (CSFII) 1989-92 Data
  - 1994-96 data are being validated for use in the near future

Exposure - Residues

Tier	Residue Data Used
1	Tolerance level residues
2	Field trial residues
3	Monitoring data:
	USDA PDP data
	FDA data
4	Market basket data

As we move through the tiers, we refine our exposure estimates because we use residue data closer to the point of consumption

Exposure - Computation

- DEEM™ is the software used by the Agency
- Allows the Agency to combine the consumption from USDA's surveys and available residue data
- Calculates the exposure and resultant risk for the general population and 21 population sub-groups (e.g., infants, children 1-6)

Data Used In Risk Assessments

- **Monitoring Data:**
  - USDA's Pesticide Data Program (PDP) Data
    - Statistically designed for dietary risk assessment
    - Important infants' and children's food sampled
    - Prepared as in the home (e.g., washing and peeling)
  - FDA Surveillance Monitoring Data
    - Designed for tolerance enforcement
    - Large number of samples and types of food

Note: Measured residues in composite samples -- samples are comprised of many individual serving size items.

Types of Risk Assessments

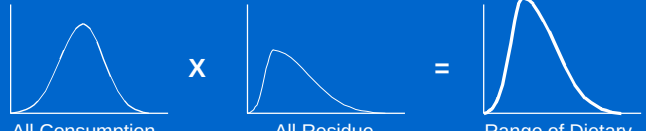
- **Acute Dietary:**

  Conducted Tier 2 (non-probabilistic) and Tier 3 (probabilistic) assessments

  - Tier 2 assumed tolerance level residues, % of crop treated, field trials, and processing data
  - Tier 3 used monitoring data, % of crop treated, field trials, processing data, and canning study

Probabilistic Dietary Risk Assessments

Probabilistic



- Assumes that any one piece of fruit or vegetable consumed can have residues anywhere in the range of residues observed. Therefore, a consumer's chance of consuming a high-residue piece of fruit or vegetable depends both on how much of the item he or she eats AND how frequently that item is found to have high residues.
- More realistic exposure estimates.

Residue Data Used for Dietary Exposure

- USDA Pesticide Data Program (PDP) Data
- FDA Surveillance Monitoring Data

} ~75% of foods

- Field Trial Data: *(13 food types, some low consumption foods, e.g., green onions, artichokes)*
- Processing Data

NOTE: Monitoring data were translated to similar crops if the crops had similar use patterns (e.g., peaches to nectarines)

USDA PDP Data Used for Dietary Risk Assessment

- Apples, apple juice
- Peaches, fresh & can
- Pears
- Grapes
- Celery
- Spinach
- G Beans, fresh, can & frz
- Peas, fresh, can & frz
- Sweet Potatoes
- Tomatoes
- Wheat
- Broccoli
- Potatoes
- Lettuce
- Soybean
- Corn

Translated:

Turnips, Brussels Sprouts, Cabbage, Cauliflower, Collards, Kale, Mustard Greens, Lentils, Nectarines, Barley, Oats, Rye

Other Data Used for Dietary Risk Assessment

- FDA
  - Cherries
  - Cotton
  - Plums
  - Onions
  - Dried Beans
  - Dried Peas
  - Rice
- Field Trials
  - Artichoke
  - Green Onion
  - Sugar Beets
  - Canola
  - Hops
  - Turnip Greens
  - Almonds
  - Peanuts, Pecans, Walnuts

Examples of Residue Data Used

Crop/Commodity Specific Residue Data Used in Dietary Risk Assessment	
Crop/Commodity	Residue Data Used
Soybean	Residue data from blended grain plus processing and cooking factors. Source: USDA's PDP, Submitted Study
Corn (sweet)	Residue data from frozen/can plus a cooking factor. Source: USDA's PDP
Corn (sweet)	Residue data from composite samples plus a cooking factor. Source: FDA
Pear	Residue data from single serving samples plus a cooking factor. Source: USDA's PDP

Acute Dietary Analysis Results

Pre- & Post-mitigation Risk Estimates as Percent of the aPAD

Population	Percentile		
	Tier II Deterministic Assessment 9/1/98 95th	Probabilistic Assessment 6/4/99 99.9th	Post-Mitigation Assessment 8/2/99 99.9th
U.S Population	>10,000	378	60
Infants	>10,000	377	61
Children 1-6	>10,000	881	78
Children 7-12	>10,000	389	78

Chronic Dietary Analysis Results

Pre- & Post-mitigation Risk Estimates as Percent of the cPAD

Population	9/1/98	6/4/99	8/2/99
U.S Population	>2,000	17	3
Infants	>2,000	29	3
Children 1-6	>2,000	47	8
Children 7-12	>2,000	23	5

Dietary Risk Assessment: *Summary*

- Acute
  - Highly refined
  - Acute risk estimates from pre-mitigation uses are above the level of concern
  - Risk estimates reflecting recent use changes reduces risk to below the Agency's level of concern
- Chronic
  - Highly refined
  - Chronic risk estimates from pre-mitigation uses are below the level of concern

Drinking Water Risk Assessment

- Conducted because of use pattern and environmental fate profile
- Available drinking water monitoring data are limited
- Drinking water assessment is based on surface water monitoring data and simulation modeling

Drinking Water Risk Assessment

Based on Use Changes Reflecting Mitigation Measures

- Acute (For Children 1-6)
  - 78% of acute PAD used by exposure through food
- Targeted monitoring data showed some surface water concentrations that would exceed levels of concern if detected in drinking water
  - Direct drinking water data were not available

Drinking Water Risk Assessment

Based on Use Changes Reflecting Mitigation Measures

- Chronic (For Children 1-6)
  - 8% of chronic PAD used by exposure through food
- Limited drinking water monitoring data were much less than levels of concern

Aggregate Risk Assessment

- Includes exposures from various sources:
  - food
  - drinking water
- Aggregate risk assessment of methyl parathion currently includes food and drinking water only
- Both adults and children considered

Aggregate Risk Assessment

Based on Use Changes Reflecting Mitigation Measures

- Acute aggregate risk assessment indicates some room for water
- Chronic aggregate risk is not expected to be of concern

Worker Risk Assessment

- Handlers
  - professional pesticide applicators and farmer/growers who mix, load, and apply pesticides
- Postapplication Workers
  - workers who prune, thin, hoe, prop, and harvest crops following pesticide application

Worker Risk Background

- Worker risk assessments are required under FIFRA
- Assessment methods were developed jointly with Health Canada, California DPR, and OECD
- Same assessment methods are used for Registration and for Reregistration

Hazard Identification

- Methyl parathion toxicity
  - Acutely toxic by all routes
  - NOAEL = 0.11 mg/kg/day.
    - LOAEL = 0.53 mg/kg/day based on neuropathy and plasma, RBC, and brain ChE inhibition
  - Uncertainty Factors:
    - 10X for extrapolating between rats and humans
    - 10X for variability in humans
    - Target MOE = 100

Incident Data

- Methyl Parathion Incidents
  - California DPR (1982-1995) - 18 cases
  - Poison Control Center
    - 1985-92 -- 102 occupational, 146 non-occupational
    - 1993-96 -- 26 occupational, 91 non-occupational

Dermal Absorption

- Dermal absorption study is not available
- 100% oral equivalent dermal absorption supported by:
  - Comparable acute oral LD_{50} and dermal LD_{50} (4.5 mg/kg vs. 6.0 mg/kg) in rats
  - Comparable levels of ChE inhibition in rats after similar oral and dermal doses

Handler Assessment

- The handler risk assessment is based on:
  - Activity (e.g., mixer/loader)
  - Formulation and application equipment
  - Unit exposure (mg ai/lb ai handled)
  - Amount of pesticide handled
  - Level of protection (e.g., PPE or engineering controls)
  - Toxicity endpoint
  - 100% dermal absorption

Handler Assessment

- Methyl parathion use
  - Two formulations -- microencapsulated (MC) and emulsifiable concentrate (EC)
  - Assessment done for use on 24 crops
  - Applied by air, airblast sprayer, chemigation, and groundboom sprayer at a rate of 0.25 to 3.0 lbs ai per acre

Handler Assessment

Handler Exposure and Risk Calculations

$$\text{Dose} = \frac{(\text{Unit Exposure}) \times (\text{Amount Handled}) \times (\text{Absorption})}{\text{Body Weight}}$$

$$\text{MOE} = \frac{\text{NOAEL (mg/kg/day)}}{\text{Dose (mg/kg/day)}}$$

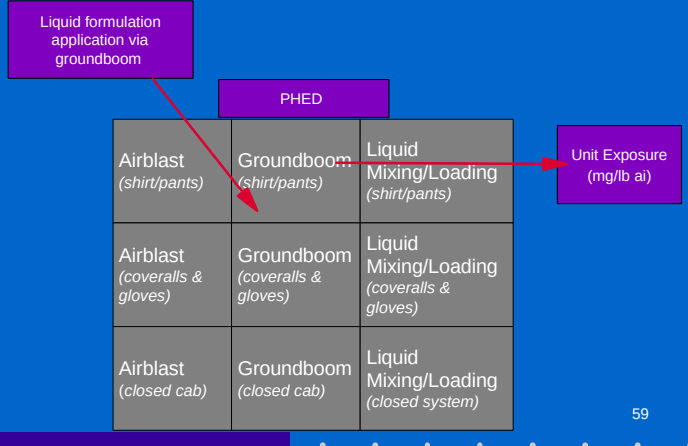
Handler Assessment

- **Data Sources:**
  - Labels
  - Use information
  - Standard values
  - Chemical-specific studies
  - Pesticide Handlers Exposure Database (PHED)

Pesticide Handlers Exposure Database

- Developed by Task Force - USEPA, Health Canada, California DPR, and ACPA
- Contains actual exposure data generated by registrants
- Widely accepted - Used in Canada, Australia, & Europe
- Most complete source of pesticide monitoring data
- Adds consistency to risk assessments

PHED



Handler Assessment Scenarios

- **Emulsifible Concentrate (EC) Formulation**
  - **Mixer/Loader**
    - –Aerial and Groundboom
  - **Applicator**
    - –Aerial and Groundboom
  - **Flagger**
    - –Aerial
- **Unit exposures from PHED**

Handler Assessment Scenarios

- **Microencapsulated (MC) Formulation**
  - **Mixing/Loading**
    - –Aerial, Chemigation, Groundboom, or Airblast
  - **Applying**
    - –Aerial, Groundboom, and Airblast
  - **Flagging:**
    - –Aerial Applications
- **Unit exposures from PHED (for liquids)**

Handler Assessment

Groundboom[1] (EC & MC)	Range of MOEs	
	PPE[2]	Engineering Controls[3]
Mixer/Loader (M/L)	1.9 - 15	3.7 - 30
Applicator (A)	2.9 - 23	6.4 - 51

[1]Short and intermediate term duration; combined inhalation and dermal routes; 80 acres treated)

[2]Double layer of clothing, chemical-resistant gloves (M/L, A)

[3]Closed system, single layer clothing, chemical-resistant gloves (M/L); Enclosed cab, single layer clothing, no gloves (A)

Handler Assessment

Airblast[1] (MC only)	Range of MOEs	
	PPE[2]	Engineering Controls[3]
Mixer/Loader (M/L)	5.6	11
Applicator (A)	0.44	4.9

[1]Short and intermediate term duration; combined inhalation and dermal routes; 40 acres treated per day

[2]Double layer of clothing, chemical-resistant gloves (M/L, A)

[3]Closed system, single layer clothing, chemical-resistant gloves (M/L); Enclosed cab, single layer clothing, no gloves (A)

Handler Assessment

Chemigation[1] (MC only)	Range of MOEs	
	PPE[2]	Engineering Controls[3]
Mixer/Loader (M/L)	0.64 – 2.6	1.3 – 5.1

[1]Short and intermediate term duration; combined inhalation and dermal routes; 350 acres treated)

[2]Double layer of clothing, chemical-resistant gloves (M/L)

[3]Closed system, single layer clothing, chemical-resistant gloves (M/L)

Handler Assessment

Aerial[1] (EC & MC)	Range of MOEs	
	PPE[2]	Engineering Controls[3]
Mixer/Loader (M/L)	0.43 - 3.4	0.84 - 6.8
Applicator (A)	Not Feasible	1.4 - 12
Flagger (F)	0.73 - 5.8	32 - 260

[1]Short and intermediate term duration; combined inhalation and dermal routes; 350 acres treated)

[2]Double layer of clothing, chemical-resistant gloves (M/L); Double layer of clothing (F)

[3]Closed system, single layer clothing, chemical-resistant gloves (M/L); Enclosed cab, single layer clothing, no gloves (A, F)

Handler Risk Assessment Summary

- No chemical specific data available, so PHED data were used
  - PHED data for liquids used to represent microencapsulated formulation
- Combined dermal & inhalation risks were calculated based on the maximum PPE or engineering controls
- Risks are of concern for all scenarios, irrespective of the use of closed mixing/loading, closed cabs, and protective clothing

New Use Pattern - Handler Risks

- Proposed Mitigation Measures
  - Closed mixing/loading systems for all uses and formulations by 2001 growing season
  - Enclosed cabs/cockpits for all uses and formulations by 2001 growing season
- Airblast equipment use only on tree nut crops
- More than 80% of total methyl parathion is applied by professional aerial applicators

Postapplication Worker Assessment

- Postapplication risk assessment is based on:
  - Dislodgeable Foliar Residue (DFR):
    - amount of pesticide residue that workers contact
  - Transfer Coefficient (Tc):
    - indicator of amount of foliar contact that a worker has for each crop and activity
  - Absorption, hours worked per day, body weight

Postapplication Worker Assessment

- Sources of Information
  - DFR Data
    - Standard values
    - Chemical specific studies
  - Transfer Coefficients
    - Standard values
    - Chemical specific studies

Postapplication Worker Assessment

Exposure and Risk Calculations

$$\text{Dose} = \frac{\text{DFR} \times \text{Transfer Coefficient} \times \text{Hrs Worked} \times \text{Absorption}}{\text{Body Weight (kg)}}$$

$$\text{MOE} = \frac{\text{NOAEL (mg/kg/day)}}{\text{Dose (mg/kg/day)}}$$

Postapplication Worker Assessment Summary

- Assessment based on open literature study for EC (Buck *et al.*, 1980) and standard values for MC
- Calculated reentry intervals range from:
  - 7 to 9 days for emulsifiable concentrate formulation
  - 30 days for microencapsulated formulation

New Use Pattern - Postapplication

- Remaining crops
  - Few require hand harvesting
  - As an interim measure the current REIs change from 2-3 days to 4-5 days
  - The Agency is obtaining chemical specific studies to address concerns regarding REIs

Ecological Risk Assessment

Environmental Fate And Effects Assessment

- **Environmental Fate Assessment:**
  - Lab and Field Studies
- **Water Resource Assessment:**
  - Monitoring and Modeling
- **Ecological Toxicity:**
  - Acute and Chronic Risks
- **Ecological Risk Assessment:**
  - Exposure and Toxicity, Incidents

Environmental Fate of Methyl Parathion

- **Major Route of Degradation**
  - microbial degradation; aqueous photolysis
- **Persistence**
  - methyl parathion is not highly persistent
  - residual toxicity is greater for the microencapsulation than the EC formulation
- **Mobility**
  - may reach surface waters under normal use
  - less likely to contaminate groundwater

Summary of Ecological Toxicity

Species	Toxicity
Birds	Very Highly Toxic
Small Mammals	Very Highly Toxic
Bees	Very Highly Toxic
Fish	Moderately to Highly Toxic
Aquatic Invertebrates	Very Highly Toxic

Ecological Risk Assessment

Toxicity and Exposure

- **Risk Quotients (RQ):** *Ratio of estimated exposure concentration to toxicity endpoint*

$$\text{Acute RQ} = \frac{\text{Peak environmental concentration}}{\text{LD50, LC50, or EC50}}$$

$$\text{Chronic RQ} = \frac{\text{Long-term average concentration}}{\text{NOAEC or LOAEC}}$$

- RQ is compared to Levels of Concern (LOC)

Summary Of Ecological Risk Assessment: Aquatic

Risk to Freshwater Aquatic Invertebrates

Duration	Level of Concern	RQ's
Acute	RQ ≥0.5	30.9 to 1,817
Chronic	RQ ≥1 (for survival)	71.5 to 3,531

Based on PRZM/EXAMS simulated acute and chronic exposure

Summary Of Ecological Risk Assessment: Terrestrial

Risk to Birds and Small Mammals

Species and Duration		Level of Concern	RQ's
Acute	Avian	RQs ≥ 0.5	0.42 to 25.53
	Small Mammal		3.2 to 190
Chronic Avian		RQs ≥ 1	1.91 to 114.8 for reproductive

Avian Effects Reported in Open Literature

- Reproductive effects with short-term exposure
- Changes in maternal care and viability of young birds
- Weight loss

Incidents Confirm Acute Risk to HoneyBees

- At least 22 bee kill incidents since 1992 with detections of methyl parathion
  - 19 of these associated with orchards
- LD_{50} is 0.111µg/bee
- Toxicity seen at 0.03 to 0.5 lb/acre

Possible Endocrine Disruption

- Observed effects in the open literature:
  - Damage to oocytes in fish (Rastogi and Kulrestha, 1990)
  - Disruption of eggshell formation in birds (Bennett and Bennett, 1990)
  - World Wildlife Fund submitted 7 other studies as evidence of potential endocrine disruption
- Methyl parathion will be included in future Endocrine Disruptor Screening Program

Drinking Water Assessment

- Few drinking water data are available
  - Community water systems not required to analyze for methyl parathion
  - Few systems capable of this analysis
- One chronic drinking water study available (Louisiana, 1994)
  - Year of weekly composite samples
  - Average concentration 0.009 ppb

Methyl Parathion in Surface Water

- Methyl parathion can contaminate surface water under normal use conditions
  - Maximum concentration reported is 6 ppb (California)
- High rate of detections seen in recent monitoring for NAWQA Mississippi Embayment study
  - Maximum detection of 0.422 ppb from this limited monitoring should be considered a typical value that can be expected in a high use area

Drinking Water Assessment

- Acute assessment based on surface water monitoring and modeling
- EPA has more confidence in monitoring data for acute drinking-water estimate than in simulation modeling results for methyl parathion
- Drinking water monitoring and data on effects of water treatment needed for the assessment

Summary and Conclusion

Summary of Revised Dietary Risk Assessment

- Based on recent use changes:
  - Acute dietary risk from food at the 99.9th percentile is below the level of concern for all population sub-groups
  - Chronic dietary risk from food is below the level of concern for all population sub-groups
  - Aggregate risks may be of concern

Summary of Worker Risk Assessment

- Handler Exposure (Mixer/Loader/Applicator)
  - Based on non-chemical specific data, risk of concern for all scenarios
  - Chemical-specific data required of registrant
    - submitted data may or may not indicate the need for additional mitigation
- EPA will impose mitigation measures for methyl parathion based on review of new data

Summary of Worker Risk Assessment

- Post-Application Reentry Exposure
  - Based on non-chemical specific data, risk of concern for all scenarios
  - Chemical-specific data required by registrant
    - submitted data may or may not indicate the need for additional mitigation
  - Interim REIs will be increased to 4-5 days pending the submission and review of data

Summary of Ecological Risk Assessment

- Terrestrial
  - Use reduction of microencapsulated formulation expected to significantly reduce risk to bees
  - Recent use changes are expected to reduce risks to small mammals and birds
- Aquatic
  - Recent use changes are expected to reduce risks to fish and aquatic invertebrates

Next Steps

- Voluntary use cancellations will significantly reduce dietary risk
- 60-day public participation period opens
- EPA will continue to:
  - Resolve potential exposure to workers
  - Resolve potential water and ecological concerns